



Teachers' guide – summary sheet

1. IDENTIFICATION DETAILS

Title:	Degree in Biotechnology (Plan 2009)		
Faculty/School:	Bio-sanitary Sciences		
Course subject:	Molecular Genetics and Genetic Expression Regulation		
Type:	Obligatory	Credits ECTS:	6
Year / Semester:	Year Three – 5th semester	Code:	2034
Subject:	Genetics		
Module:	Biochemistry and molecular biology		
Language:	Spanish		
Total number of hours undertaken by pupil:	150		

2. DESCRIPTION OF THE COURSE

In the Molecular Genetics course we will study the structure of genetic material and the molecular mechanisms of their replication and expression, both in eukaryotic cells and in eukaryotic organisms. Also analyze, interpret and discuss scientific papers related to theoretical and practical content of the course.

3. SKILLS TO DEVELOP

3.1. General skills

Acquire a solid technological and humanistic background necessary for the development of professional activity.
Encourage the concern of knowledge as a key tool in the process of personal and professional growth of the student.
Develop the ability to search, assimilation, analysis, synthesis and mutual exchange of information.
Know the basic principles and tenets of the experimental sciences and humanities.
Develop habits of oral and written communication.
Acquire the skills required for experimental work: conducting, collecting and drawing conclusions, understanding the limitations of the experimental approach.
Acquire knowledge of biochemistry and molecular biology necessary for the development of biotechnological products and processes.
Ability to work as a team and manage groups.
Acquire the capacity of analytical, synthetic, reflective, critical, theoretical and practical thinking.

Knowing how to plan time effectively.
Develop the capacity and commitment of their own learning and personal development.

3.2. Specific skills

Understand and know the basics of biochemistry and molecular biology to address biological and physiological processes of living organisms
To describe the molecular mechanisms that regulate DNA replication and repair, transcription and RNA processing and translation of mRNA.
Identify and describe the mechanisms for regulating gene expression in prokaryotes and eukaryotes.
Work properly in a laboratory with biological material (bacteria, fungi, viruses, animal and plant cells, plants and animals) including security, handling and disposal of biological waste.
Properly organize and plan work in the laboratory.
Knowing how to design and implement adequately an experimental protocol from the knowledge of different subjects.
Identify and define instruments and laboratory materials.
Able to describe, quantify, analyze and critically evaluate the results of experimental work in the laboratory.
Develop habits of rigorous thought.
Ability to communicate orally and in writing the knowledge acquired.
Analyze and synthesize ideas and main contents of all texts, to discover the arguments contained in them and the issues raised, and to judge critically on their form and content.
Apply the acquired knowledge to solving practical problems and cases relating to different subjects.
Being able to self-assess the knowledge acquired.
Ability to work effectively and coordinately in teams.

4. PRE-REQUISITES

The student accessing the course should have a strong background in cell biology, biochemistry and basic genetics to understand the subject and allow proper development.

5. WORK TIME DISTRIBUTION

CONTACT HOURS	REMOTE STUDY HOURS
65	85

6. OBJECTIVES

Know and understand the structure of genetic material and the molecular mechanisms of their replication and expression, both in eukaryotic cells and in eukaryotic organisms, as well as building the capacity of analysis, interpretation and discussion of scientific papers related to theoretical and practical content of the course.

7. INDEX OF SUBJECTS

ITEM 1. Introduction.

I. STRUCTURE AND PROPERTIES OF GENETIC MATERIAL

ITEM 2. Structure of nucleic acids.

ITEM 3. Organization of genetic material.

II. DNA replication and repair

ITEM 4. Features of replication.

ITEM 5. DNA replication in prokaryotes.

ITEM 6. Control of replication in prokaryotes.

ITEM 7. DNA replication in eukaryotes.

ITEM 8. Control of replication and cell cycle in eukaryotes.

ITEM 9. DNA repair.

III. DNA TRANSCRIPTION

ITEM 10. Transcription in prokaryotes.

ITEM 11. Transcription regulation in prokaryotes.

ITEM 12. Transcription in eukaryotes: initiation by RNA polymerase II.

ITEM 13. Transcription in eukaryotes: Initiation by RNA polymerase III and RNA polymerase I, Elongation and termination.

ITEM 14. Regulation of transcription in eukaryotes.

IV. RNA PROCESSING

ITEM 15. RNA processing, RNA hydrolysis and modification of extremes.

ITEM 16. RNA processing: splicing mechanisms.

ITEM 17. Processing of RNA: RNA editing and transport.

V. MRNA TRANSLATION

ITEM 18. Genetic code reading.

ITEM 19. Translation of RNA: Initiation.

ITEM 20. RNA Translation: Elongation and termination.

ITEM 21. Regulation of translation.

8. METHODOLOGY/LEARNING ACTIVITIES

Lectures.

Preparation and presentation of exercises

Preparation and presentation of scientific papers.

Practical classes.

Tutorials.

Website of the subject.

9. EVALUATION SYSTEM

Final exam (80%), preparation and presentation of scientific papers (10%), practical (10%).

10. BIBLIOGRAPHY

Watson J.D., et al. *Molecular Biology of the Gene*, 6th ed. USA: Benjamin Cummings y Cold Spring Harbor Laboratory Press; 2007.

Lewin B. *Genes IX*. New Jersey, USA: Pearson Prentice Hall; 2008.

Lewin, B. *Essential Genes*. New Jersey, USA: Pearson Prentice Hall; 2006.